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10/567,552	02/08/2006	Richard Harding	MERCK-3144	9249

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EXAMINER	
HON, SOW FUN	

ART UNIT	PAPER NUMBER
1794	

NOTIFICATION DATE	DELIVERY MODE
01/26/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mwzb.com

Office Action Summary	Application No.	Applicant(s)	
	10/567,552	HARDING ET AL.	
	Examiner	**Art Unit**	
	SOPHIE HON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/28/09*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 17-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *39* is/are allowed.

6)☒ Claim(s) *1-11,14-15 and 17-28,31-40* is/are rejected.

7)☒ Claim(s) *12,13,29 and 30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/28/09 has been entered.

Response to Amendment

Withdrawn Rejections

2. The 35 U.S.C. 103(a) rejections of claims 1-15, 17-30 over Gass in view of Ohnishi and O'Neill are withdrawn due to Applicant's amendment dated 01/05/09.

New Objections/Rejections

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Objections

3. Claim 40 is objected to because of the following informalities: In lines 4-5 of the claim, the term "reactive mesogen" should be rewritten as “reactive mesogen additive” so as to be consistent with line 3 where the term "reactive mesogen additive" is first introduced. It follows that the term "additive" in the beginning of line 5 should be deleted since it should be appended to the term “reactive mesogen” instead. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. Claims 1-5, 14-15, 17-24, 27-28, 31-35, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gass (US 5,808,716).

Regarding claim 1, Gass teaches an alignment layer for aligning liquid crystal molecules, said layer comprising (a) a polymer film formed from a polymer, wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups (reactive groups, column 5, lines 18-21, polymer, column 6, lines 30-40). Gass fails to teach that the polymer film comprises (b) at least one reactive mesogen additive within the film, wherein said at least one reactive mesogen additive is not said polymer used to form said polymer film, and wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen additive.

However, Gass teaches that the FLC liquid crystal layer contains a reactive mesogen additive containing reactive groups (column 5, lines 18-25) that are acrylates

(column 4, lines 65-67) and that the reactive groups in the alignment layer can also be acrylates (column 4, lines 50-51) which can be present in the form of aromatic and heteroaromatic compounds (column 7, lines 33-35). Aromatic and heteroaromatic compounds behave as mesogens when they are conjugated. Gass teaches that the reactive groups in the liquid crystal FLC layer and in the alignment layer (column 5, lines 18-25) are such that selective bonding occurs primarily between a reactive group in the FLC liquid crystal layer and a reactive group in the alignment layer, but not between reactive groups in the FLC liquid crystal layer or between reactive groups in the alignment layer (column 6, lines 1-5). Providing the alignment layer of Gass with reactive acrylate groups by adding the same reactive mesogen additive as the one that is in the FLC liquid crystal layer of Gass, would enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer. Furthermore, this modification would allow for the use of a broader range of materials which would then simplify the production process.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have added a reactive mesogen additive containing reactive acrylate groups to the alignment layer, in addition to the FLC liquid crystal layer of Gass, in order to enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process.

Regarding claims 2, 14, 22-24, 32, Gass teaches the alignment layer which is modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, as discussed above, and which comprises (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive within said polymer film, wherein the least one reactive mesogen is not said polymer used to form said polymer film, and wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen additive. Gass is silent regarding the amount of reactive compounds in the alignment layer, and thus fails to teach the claimed amount of reactive mesogen additive in the modified alignment layer.

However, Gass teaches that the amount of reactive mesogen additive in the FLC liquid crystal layer is subject to variation (suitable proportion of reactive mesogens, column 5, lines 20-25) for the purpose of providing a suitable balance between the desired bonding between the FLC liquid crystal layer and the alignment layer (column 5, lines 5-10) and the desired switching speed of the display that the layers are disposed in (column 5, lines 15-18). This means that the amount of reactive compound in the alignment layer of Gass, and hence the amount of reactive mesogen additive in the modified alignment layer of Gass, is also subject to variation, for the same purpose of providing a suitable balance between the desired bonding between the FLC liquid

crystal layer and the modified alignment layer, and the desired switching speed of the display that the layers are disposed in.

Therefore, in the absence of a showing otherwise, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have varied the amount of reactive mesogen additive in the modified alignment layer of Gass, to within a range of less than 50%, or 0.5 to 4%, or less than 20%, or less than 10%, or less than 5%, or 1 to 2%, by weight, in order to obtain a suitable balance between the desired bonding between the FLC liquid crystal layer and the modified alignment layer, and the desired switching speed of the display that the layers are disposed in, as taught by Gass.

Regarding claims 3, 31, Gass teaches that the reactive groups can be present as part of a compound in the alignment layer (column 7, lines 20-40) which can be the same reactive mesogen additive that is present in the FLC liquid crystal layer, as discussed above. In addition, Gass teaches that the reactive mesogen additive is present in monomeric form in the FLC liquid crystal layer (mesogenic molecule, column 5, lines 18-25). Thus said at least one reactive mesogen additive can also be present in monomeric form in the alignment layer after the preparation of said alignment layer, for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, as discussed above.

Regarding claim 4, the alignment layer of Gass, as modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, contains the at least one reactive mesogen after preparation of said alignment layer, as discussed above. Thus the alignment layer is obtainable from a precursor material comprising at least one reactive mesogen.

Regarding claim 5, Gass teaches that the alignment film is coated onto surfaces (column 5, lines 19-21) whereby a thin film coating is ordinarily achieved by solvent processing, as is well known in the art.

Regarding claim 15, the alignment layer of Gass, as modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, contains the at least one reactive mesogen and said polymer after preparation of said alignment layer, as discussed above. Thus a polymer precursor for preparing the alignment layer would comprise the at least one reactive mesogen additive and said polymer or a precursor of said polymer.

Regarding claims 17-18, Gass teaches a laminate comprising an alignment layer and a film comprising polymerised and/or crosslinked liquid crystal material, for the purpose of stabilizing the sublayers in the bulk of the liquid crystal layer to enhance resistance to mechanical damage (network structure may also be formed in the bulk of

the FLC layer because of bonding between reactive mesogens, column 5, lines 10-16), where the method of preparing the laminate comprises the step of providing a layer of polymerizable liquid crystal material onto an alignment layer and aligning the liquid crystal material into uniform orientation (filling the cell with the FLC material, the smectic structure is aligned, column 5, lines 1-5) followed by the step of polymerizing or crosslinking the liquid crystal material (network structure may also be formed in the bulk of the FLC layer because of bonding between reactive mesogens, column 5, lines 10-16).

Regarding claims 19-21, Gass teaches that the alignment layer is disposed in a liquid crystal display device (column 4, lines 17-22) which is an electrooptical application.

Regarding claims 27-28, 33-35, although Gass fails to teach the claimed processes of forming the alignment layer, and even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. See MPEP 2113. In the instant case, the alignment layer of Gass, as modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would

then simplify the production process, contains the at least one reactive mesogen after preparation of said alignment layer, as discussed above.

Regarding claim 38, Gass teaches an alignment layer for aligning liquid crystal molecules, said layer comprising (a) a polymer film formed from a polymer, wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups (reactive groups, column 5, lines 18-21, polymer, column 6, lines 30-40). Gass fails to teach that the polymer film comprises (b) at least one reactive mesogen additive in monomeric form within the polymer film, and wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen additive.

However, Gass teaches that the FLC liquid crystal layer contains a reactive mesogen additive containing reactive groups (column 5, lines 18-25) that are acrylates (column 4, lines 65-67) and that the reactive groups in the alignment layer can also be acrylates (column 4, lines 50-51) which can be present in the form of aromatic and heteroaromatic compounds (column 7, lines 33-35). Aromatic and heteroaromatic compounds behave as mesogens when they are conjugated. Gass teaches that the reactive groups in the liquid crystal FLC layer and in the alignment layer (column 5, lines 18-25) are such that selective bonding occurs primarily between a reactive group in the FLC liquid crystal layer and a reactive group in the alignment layer, but not between reactive groups in the FLC liquid crystal layer or between reactive groups in the alignment layer (column 6, lines 1-5). Providing the alignment layer of Gass with reactive acrylate groups by adding the same reactive mesogen additive as the one that

is in the FLC liquid crystal layer of Gass, would enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer. Furthermore, this modification would allow for the use of a broader range of materials which would then simplify the production process.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have added a reactive mesogen additive containing reactive acrylate groups to the alignment layer, in addition to the FLC liquid crystal layer of Gass, in order to enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process.

5. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gass as applied to claims 1-5, 14-15, 17-24, 27-28, 31-35, 38 above, and further in view of Tsuboyama (US 5,099,344).

Gass teaches the alignment layer which is modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, as discussed above, and which comprises (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive within said polymer film, wherein the least one reactive mesogen is not said polymer used to form said polymer film, and wherein after

preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen additive.

Regarding claims 6-7, Gass fails to teach that the polymer film is a polyimide film which does not bond with the at least one reactive mesogen additive within said polyimide film, let alone a polyimide that has repeating units of formula A of Applicant.

However, Gass teaches that the reactive groups in the liquid crystal FLC layer and in the alignment layer (column 5, lines 18-25) are such that selective bonding occurs primarily between a reactive group in the FLC liquid crystal layer and a reactive group in the alignment layer, but not between reactive groups in the FLC liquid crystal layer or between reactive groups in the alignment layer (column 6, lines 1-5). Providing an alignment layer comprising a polymer film that does not bond with the at least one reactive mesogen additive would enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer. Furthermore, this modification would allow for the use of a broader range of materials which would then simplify the production process.

Tsuboyama teaches an alignment layer that comprises a polymer film that is a polyimide film (column 4, lines 7-15) that has repeating units of formula A of Applicant (column 55, lines 35-50) and is used with an FLC liquid crystal layer (ferroelectric liquid crystal, column 54, lines 3-5) for the purpose of providing the desired bistable switching (column 54, lines 20-25). The polyimide film does not have any reactive groups that can bond with any other reactive groups.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the polyimide film that has repeating units of formula A of Applicant, as the polymer film in the modified alignment film of Gass, in order to provide the FLC liquid crystal layer with the desired bistable switching, as taught by Tsuboyama, wherein the polyimide film does not have any reactive groups that can bond with the reactive mesogenic additive, in order to enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer taught by Gass, as well as simplify the production process, as discussed above.

Regarding claim 8, Gass fails to teach that the alignment layer is a solvent processed cellulose-based film wherein the cellulose-based film is the polymer film that contains the reactive mesogen additive.

However, Tsuboyama teaches an alignment layer that is a cellulose-based film (column 4, lines 8-20, Cellulose, column 62, lines 60-67) and is used with an FLC liquid crystal layer (ferroelectric liquid crystal, column 62, lines 45-50) for the purpose of providing the desired bistable switching (column 61, lines 8-15). The cellulose based film does not have any reactive groups that can bond with any other reactive groups (CAB, Eastman Kodak, column 62, lines 60-67, which is short for cellulose acetate butyrate). A thin film is ordinarily achieved by solvent processing, as is well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a solvent processed cellulose-based thin film, as the polymer film in the modified alignment layer of Gass, in order to provide the

FLC liquid crystal layer with the desired bistable switching, as taught by Tsuboyama, wherein the cellulose based film does not have any reactive groups that can bond with the reactive mesogenic additive, in order to enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer taught by Gass, as well as simplify the production process, as discussed above.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gass in view of Tsuboyama as applied to claims 6-8 above, and further in view of Takiguchi (US 4,984,873).

Gass, as modified by Tsuboyama, teaches the alignment layer that is a solvent processed cellulose-based film, as discussed above. In addition, Gass teaches that the cellulose-based film can be a cellulose acetate butyrate film (CAB, Eastman Kodak, column 62, lines 60-67, which is short for cellulose acetate butyrate), and thus fails to teach that the cellulose-based film can also be a triacetate cellulose film.

However, triacetate cellulose film is an alternate species of cellulose-based film that is used as a cellulose-based film for an alignment layer, as evidenced by Takiguchi.

Takiguchi teaches an alignment layer that is a triacetate cellulose film (triacetyl cellulose film … is applied with horizontal alignment treatment, column 12, lines 1-10), used for the purpose of providing the desired alignment properties.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a triacetate cellulose film as the solvent processed cellulose-based film of the alignment layer of Gass, as modified by Tsuboyama, in order to obtain the desired alignment properties, as taught by Takiguchi.

7. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichimura (US 6,001,277) in view of Gass (US 5,808,716).

Ichimura teaches an alignment layer for aligning liquid crystal molecules, wherein the alignment layer comprises (b) an isomerisable azobenzene compound introduced by a polymeric precursor material comprising at least one reactive mesogen (4-(2-methacryloyloxyethoxy)azobenzene, column 36, lines 60-65, polymer, column 36, lines 1-5) which renders said alignment layer (a) a command layer wherein changes in the orientational direction of the azobenzene induce a specific alignment of an LC material coated onto said alignment layer. Ichimura fails to disclose that after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen.

However, Gass teaches an alignment layer for aligning liquid crystal molecules, wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups (reactive groups, column 5, lines 18-21, polymer, column 6, lines 30-40) which can be present in the form of aromatic and heteroaromatic compounds (column 7, lines 33-35). Aromatic and heteroaromatic compounds behave as mesogens when they are conjugated. Gass teaches that the reactive groups in the liquid crystal layer and in the alignment layer (column 5, lines 18-25) are such that selective bonding occurs primarily between a reactive group in the liquid crystal layer and a reactive group in the alignment layer, but not between reactive groups in the liquid crystal layer or between reactive groups in the alignment layer (column 6, lines 1-

5), for the purpose of providing the desired resistance to mechanical damage (column 6, lines 5-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the command layer of the alignment layer of Ichimura, after preparation, with unreacted polymerizable groups in said at least one reactive mesogen additive, to selectively bond alignment layer to the liquid crystal layer, in order to obtain the desired resistance to mechanical damage, as taught by Gass.

8. Claims 25-26, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gass as applied to claims 1-5, 14-15, 17-24, 27-28, 32-35, 38 above, and further in view of Komatsu (US 5,989,758).

Gass teaches the alignment layer which is modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, as discussed above, and which comprises (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive within said polymer film, wherein the least one reactive mesogen is not said polymer used to form said polymer film, and wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen additive. Gass is silent regarding the birefringence of the alignment layer.

However, Komatsu teaches that an alignment layer can be optically isotropic (orientation substrate, column 24, lines 14-20) and thus have a birefringence that is ideally zero, which is within the claimed range of less than 0.05, or less than 0.005, for the purpose of providing minimal optical interference.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the alignment layer with a birefringence that is with a range of less than 0.05, or less than 0.005, in order to minimize any optical interference from the alignment layer.

9. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gass as applied to claims 1-5, 14-15, 17-24, 27-28, 32-35, 38 above, and further in view of Tsuboyama (US 5,099,344) and Komatsu (US 5,989,758).

Gass teaches the alignment layer which is modified for the purpose of enhancing the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process, as discussed above, and which comprises (a) a polymer film formed from a polymer and (b) at least one reactive mesogen additive within said polymer film, wherein the least one reactive mesogen is not said polymer used to form said polymer film, and wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups in said at least one reactive mesogen additive. Gass fails to teach that the modified alignment layer or precursor material thereof, before addition of said at least one reactive mesogen, is non-mesogenic.

However, Tsuboyama teaches an alignment layer that is a cellulose acetate butyrate film which is non-mesogenic (column 4, lines 8-20, Cellulose, CAB, Eastman Kodak, column 62, lines 60-67) is used with an FLC liquid crystal layer (ferroelectric liquid crystal, column 62, lines 45-50) for the purpose of providing the desired bistable switching (column 61, lines 8-15). The cellulose acetate butyrate film does not have any reactive groups that can bond with any other reactive groups.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used an alignment layer or a precursor thereof, which is non-mesogenic before addition of said at least one reactive mesogen additive, for the alignment layer of Gass, in order to obtain the desired bistable switching, as taught by Tsuboyama.

Gass, as modified by Tsuboyama, fails to teach that the non-mesogenic alignment layer, before the addition of said at least one reactive mesogen additive, or the non-mesogenic precursor material thereof, has a birefringence that is within a range of less than 0.01.

However, Komatsu teaches that an alignment layer can be optically isotropic (orientation substrate, column 24, lines 14-20) and thus have a birefringence that is ideally zero, which is within the claimed range of less than 0.01, for the purpose of providing minimal optical interference. It stands to reason that the precursor for the alignment layer also desirably has a birefringence of ideally zero, which is within the claimed range of less than 0.01, for the purpose of providing an alignment layer that gives minimal optical interference.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used an alignment layer, before the addition of said at least one reactive mesogen additive, or the non-mesogenic precursor material thereof, as the alignment layer, before the addition of said at least one reactive mesogen additive, or the non-mesogenic precursor material thereof, of Gass, as modified by Tsuboyama, with a birefringence that is within a range of less than 0.01, in order to obtain an alignment layer that gives minimal optical interference, as taught by Komatsu.

10. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gass (US 5,808,716) as evidenced by Lacker (US 4,944,576).

Gass teaches an alignment layer for aligning liquid crystal molecules, said layer comprising (a) a polymer film formed from a polymer, wherein after preparation of said alignment layer, said alignment layer contains unreacted polymerizable groups (reactive groups, column 5, lines 18-21, polymer, column 6, lines 30-40). Gass fails to teach that the polymer film comprises (b) at least one reactive mesogen additive in monomeric form within the polymer film, wherein said at least one reactive mesogen additive contains unreacted polymer groups.

However, Gass teaches that the FLC liquid crystal layer contains a reactive mesogen additive containing reactive groups (column 5, lines 18-25) that are acrylates (column 4, lines 65-67) and that the reactive groups in the alignment layer can also be acrylates (column 4, lines 50-51) which can be present in the form of aromatic and heteroaromatic compounds (column 7, lines 33-35). Aromatic and heteroaromatic

compounds behave as mesogens when they are conjugated. Gass teaches that the reactive groups in the liquid crystal FLC layer and in the alignment layer (column 5, lines 18-25) are such that selective bonding occurs primarily between a reactive group in the FLC liquid crystal layer and a reactive group in the alignment layer, but not between reactive groups in the FLC liquid crystal layer or between reactive groups in the alignment layer (column 6, lines 1-5). Providing the alignment layer of Gass with reactive acrylate groups by adding the same reactive mesogen additive as the one that is in the FLC liquid crystal layer of Gass, would enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer. Furthermore, this modification would allow for the use of a broader range of materials which would then simplify the production process.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have added a reactive mesogen additive containing reactive acrylate groups to the alignment layer, in addition to the FLC liquid crystal layer of Gass, in order to enhance the level of selective bonding between the FLC liquid crystal layer and the alignment layer that is taught by Gass, as well as allow for the use of a broader range of alignment layer materials which would then simplify the production process.

Gass fails to teach that said at least one reactive mesogen additive is added to the polymer after polymerization thereof as a plasticizer to improve processibility of the polymer. However, a mesogen compound inherently functions as a plasticizer to improve the processibility of the polymer matrix, as evidenced by Lacker.

Lacker teaches that a mesogen compound inherently functions as a plasticizer to improve the processibility of the polymer matrix (liquid crystal, fraction is retained in the polymer as isotropic plasticizers, column 5, lines 40-45).

Allowable Subject Matter

11. Claim 39 is allowed.

12. Claims 12-13, 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

13. Applicant's arguments regarding claims 1-11, 14-15, 17-38, 40 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample, can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sophie Hon/

Sow-Fun Hon

Examiner, Art Unit 1794